

REMARKS

The Examiner rejects claims 1-5, 7, 9, 10, 12, and 13 under 35 U.S.C. §102(e) or (a) as being anticipated by Nagano (U.S. Pat. No. 5,834,576) in view of Chamberlain (U.S. Pat. No. 5,605,991), Hoxmeier (U.S. Pat. No. 5,773,521), or Watson (U.S. Pat. No. 4,466,904).

Examiner also rejects claims 11, 14, and 15 under 35 U.S.C. §103(a) as being obvious over Nagano in view of Nagasawa (U.S. Pat. No. 5,310,813). To expedite prosecution of this application, Applicants cancel claims 11, 14, and 15 in this response and thus ask the Examiner to withdraw the obviousness rejection.

Applicants respectfully traverse the anticipation rejection of claims 1-5, 7, 9, 10, 12 and 13 because Nagano does not teach the use of any chain transfer agent.

Claim 1 defines a process that comprises (a) forming a monomer stream containing an acrylic monomer, a polyether macromonomer, and a chain transfer agent; an initiator stream; and, optionally, a chain transfer agent stream; (b) polymerizing the streams; and (c) continuously withdrawing a polymer stream. Claims 2-5, 7, 9, 10, 12 and 13 depend from claim 1, and each incorporates the limitations of claim 1. If claim 1 is patentable, claims 2-5, 7, 9, 10, 12, and 13 must be patentable.

The Examiner states in the Office Action of February 26, 2002: "**Nagano is silent about the use of chain transfer agents.**" *See page 4 of February 26 Office Action.* However, the Examiner reverses herself in the current Office Action, asserting: "With regard to using a chain transfer agent in polymerization step, Nagano teaches that it is desirable to add molecular oxygen or air in order to restrain polymerization of acrylic ester and cyclic ether compound." (Emphasis in original). The Examiner cites *Chamberlain*, *Hoxmeier* and *Watson* to explain that oxygen can be a chain transfer agent. (*See page 3, the Office Action of August 19, 2002.*)

First, Applicants respectfully contend that Nagano teaches the use of oxygen as an inhibitor rather than as a chain transfer agent. Nagano reads:

"Therefore, when reacting the acrylic ester with the cyclic ether compound, it is desirable to add a polymerization inhibitor or molecular oxygen to the system of reaction in order to restrain the polymerization of the acrylic ester, the cyclic ether and the acrylic ester compound." (Emphasis added). (Column 12, lines 24-29).

From the above language, it is clear that Nagano teaches the use of oxygen to inhibit polymerization. Nagano does not, either expressly or inherently, teach the use of any chain transfer agent.

Second, it is well established that oxygen is an inhibitor rather than a chain transfer agent in free radical polymerization. See George Odian, *Principles of Polymerization*, Second Edition, 1981, page 249. See also Paul J. Flory, *Principles of Polymer Chemistry*, 1990, page 168. (Copies of the references are attached.)

When a substance functions as an inhibitor, it adds to a propagating chain to form a new radical that is inactive and substantially less reactive, but it does not form a new propagating chain (see scheme (1)).



In contrast, a chain transfer agent often bears active hydrogen or other groups that can be abstracted. A chain transfer agent terminates a propagating chain and forms a new, small radical that can grow a new chain (see scheme 2).



Oxygen reacts with a propagating chain to form a peroxide radical (see scheme (3)). See *Flory* at page 168. The peroxide radical has rather low reactivity and thus it slows down or stops the polymerization. *Id.* Thus oxygen is an inhibitor but not a chain transfer agent in free radical polymerization.



Because the meaning of "inhibitor" in Nagano is clear and consistent with the generally accepted meaning of the term, the Examiner's use of "extra" references, *Chamberlain, Hoxmeier and Watson*, is unnecessary. MPEP §2131.01 II.

Nor *Chamberlain, Hoxmeier* or *Watson* is helpful because none of them teaches or suggests that oxygen is a chain transfer agent in a free radical polymerization. Both

*Chamberlain* and *Hoxmeier* use oxygen to terminate an anionic polymerization. Unfortunately, these references confuse *termination agent* with *chain transfer agent* in anionic polymerization. Nevertheless, even if oxygen could be a chain transfer agent in an anionic polymerization, it cannot be a chain transfer agent in a free radical polymerization as discussed above. *Watson* teaches the use of phenothiazine as inhibitor in the distillation of aromatic monomers. *Watson* has no teachings or suggestions of the use of oxygen and thus it is irrelevant.

Finally, the Examiner should note that oxygen appears nowhere in Applicants' list of chain transfer agents. Applicants' suitable chain transfer agents include "alkyl amines, alkyl sulfides, carbon tetrahalides, allyl ethers, and mercaptans." *See page 5 of the application.* Thus, however oxygen would function, Applicants clearly intend to exclude it.

In summary, Nagano fails to anticipate Applicants' claim 1 because the claim requires a chain transfer agent and Nagano fails to teach this element. While Nagano teaches the use of oxygen, it is well settled that oxygen is an inhibitor but not a chain transfer agent for a free radical polymerization. The extra references (*Chamberlain, Hoxmeier, and Watson*) are not inconsistent with this generally accepted principle. Claims 2-5, 7, 9, 10, 12, and 13 depend from claim 1, so they must also be patentable.

Applicants respectfully ask the Examiner to enter the cancellation of claims 11, 14 and 15, withdraw the anticipation rejection of claims 1-5, 7, 9, 10, 12 and 13, and to allow this case to issue. The attached page is captioned "Version with markings to show changes made."

Respectfully submitted,  
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**VERSION WITH MARKINGS TO SHOW CHANGES MADE**

**In the Claims:**

Claims 11, 14 and 15 have been cancelled.

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